

CLAIMS

1. A sol comprising a precipitated component in an amount of less than 10 mass% based on the total solid content of the sol and comprising titanium oxide  
5 comprising a transition metal compound.

2. The sol according to claim 1, wherein the sol has a transmittance of 50% or more at a wavelength of 550 nm, as measured by use of a cell having an optical path length of 2 mm, when the sol contains water as a medium  
10 and has a solid content of 1 mass%.

3. The sol according to claim 1 or 2, wherein the transition metal compound does not contain particles having a particle size larger than 1 nm in an amount of 5 mass% or more.

4. The sol according to claim 1 or 2, which comprises the transition metal compound in an amount, as reduced to metal, of 0.01 to 1 mass% based on the total solid content.  
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5. The sol according to claim 1 or 2, wherein the transition metal compound comprises at least one selected from the group consisting of metal elements of Group 8 to 11 in the Periodic Table.  
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6. The sol according to claim 1 or 2, wherein the transition metal compound comprises at least one selected from the group consisting of metal elements of Group 10 in the Periodic Table.  
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7. The sol according to claim 1 or 2, wherein the transition metal compound comprises platinum as the transition metal.

8. The sol according to claim 1 or 7, wherein the transition metal compound is a chloride.  
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9. The sol according to claim 8, wherein the sol comprises a solid component which exhibits peaks at 72.5 eV and 75.5 eV (within a measurement error range of  $\pm 1.0$  eV), as measured through X-ray photoelectron spectroscopy.  
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10. The sol according to claim 1 or 2, which

comprises a photocatalyst exhibiting photocatalytic activity under visible light.

11. The sol according to claim 1 or 2, wherein the solid component of the sol exhibits a diffraction peak of lattice constant  $d$  (Å) of 2.90 (within a measurement error range of  $\pm 0.02$  Å), as measured through powder X-ray diffraction employing Cu-K $\alpha$ 1 rays.

12. The sol according to any one of claims 1 to 11, wherein the solid component in the sol comprises a brookite titanium oxide.

13. The sol according to claim 12, wherein the solid component in the sol comprises a brookite titanium oxide in an amount of 10 mass% or more, as determined through Rietveld analysis.

14. The sol according to claim 12, wherein the solid component in the sol comprises a brookite titanium oxide in an amount of 30 mass% or more, as determined through Rietveld analysis.

15. The sol according to any one of claims 1 to 14, wherein the solid component of the sol has a BET specific surface area of 20 to 400 m<sup>2</sup>/g.

16. A method for producing a sol, characterized in that the method comprises mixing an aqueous solution of a transition metal compound with a sol having a precipitated component in an amount less than 10% based on the total solid content in the sol and comprising titanium oxide.

17. A method for producing a sol, characterized in that the method comprises mixing a transition metal compound with a titanium compound and subjecting the mixture to hydrolysis.

18. A method for producing a sol, characterized in that the method comprises hydrolyzing a titanium compound in an aqueous solution comprising a transition metal compound.

19. A method for producing a sol according to claim

17 or 18, wherein the titanium compound is titanium tetrachloride or an aqueous solution of titanium tetrachloride.

5       20. The method for producing a sol as set forth in any one of claims 16 to 18, wherein the transition metal compound comprises a chloride of the transition metal.

21. The method for producing a sol as set forth in any one of claims 17 to 20, wherein hydrolysis is performed at 50°C to a boiling temperature.

10       22. The method for producing a sol according to claim 21, wherein hydrolysis is performed at 75°C to a boiling temperature.

23. The method for producing a sol as set forth in any one of claims 17 to 22, wherein the titanium compound is added dropwise so as to mix with the transition metal compound upon hydrolysis.

24. A sol produced through the method for producing the sol as set forth in any one of claims 16 to 23.

20       25. A powder produced by drying the sol as set forth in any one of claims 1 to 15 or 24.

26. A powder produced by drying the sol as set forth in any one of claims 1 to 15 or 24, through heating, reducing pressure, or freeze-drying, and by grinding or pulverizing the dried product.

25       27. An organic polymer comprising the sol as set forth in any one of claims 1 to 15 or 24, or the solid component in the sol.

28. An organic polymer comprising, on a surface thereof, the sol as set forth in any one of claims 1 to 15 or 24, or the solid component in the sol.

30       29. A coating composition comprising the sol as set forth in any one of claims 1 to 15 or 24, and a binder component.

35       30. A thin film produced by applying to a substrate the sol as set forth in any one of claims 1 to 15 or 24, or the coating composition as set forth in claim 29, and drying or hardening.

31. The thin film according to claim 30, which is hardened at 800°C or lower.

32. The thin film according to claim 30, which is hardened at 150°C or lower.

5 33. The thin film according to claim 30, which is hardened at 60°C or lower.

34. The thin film according to any one of claims 30 to 33, wherein the substrate comprises ceramics, metal, glass, plastics, paper, or wood.

10 35. An article having on a surface thereof or comprising a substance produced from the sol as set forth in any one of claims 1 to 15 or 24.

36. An article according to claim 35, which is at least one member selected from the group consisting of  
15 building materials, fluorescent lamps, glass panes, machinery, vehicles, glass products, household electrical appliances, water purifying apparatuses, agricultural materials, electronic apparatus, tools, tableware, bath products, toiletry products, furniture, clothing, cloth  
20 products, fibers, leather products, paper products, sporting goods, beauty-related instruments, health improvement instruments, medical goods, futon, containers, eyeglasses, signboards, piping, wiring, brackets, sanitary materials, and automobile parts.